

encapsulating the semiconductor chip 12 and the solder bumps 11. This encapsulating material 19 is a low viscous epoxy resin containing a solid filler in 70% to 90%, and the solid filler consists of fine particles of silicon and quartz with a particle diameter of 0.01-0.05 mm.

The molded underfilling technology is characterized in that, after mounting the semiconductor chip 12 on the substrate 10, a molding process is performed in accompany with a cavity between the chip 12 and the substrate 10 being underfilled, and the encapsulating material 19 is injected into a mold (not shown) with a plurality of air vents 17 connected to the external for ventilating excess air so as to eliminate the occurrence of voids. However, due to the encapsulating material 19 having low viscosity (high fluidity) and fine fillers, it often unavoidably flashes around the air vents 17 after completing the molding process, as shown in Fig. 2. This therefore seriously deteriorates the quality and appearance of the FCBGA semiconductor package 1.

The use of such an encapsulating material having low viscosity and fine fillers helps reduce the filling and curing time. If this encapsulating material is applied to a conventional BGA semiconductor package, in correspondence to densely distributed bonding wires and small bond pitch of 50 μm or below formed on a semiconductor chip in the semiconductor package, the encapsulating material used in a molding process can therefore effectively reduce filling impact generated during injecting the encapsulating material, and prevent wire sweep from occurrence. However, the flash problem still can not be eliminated when the encapsulating material flows through a plurality of air vents located at corners, as shown in the drawing. Thus, how to solve the flash problem is a critical subject to endeavor.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a semiconductor

package and a method for fabricating the same, in which flash of an encapsulating material can be prevented from occurring around air vents, so that the quality and appearance of the semiconductor package can be well maintained.

Another objective of the invention is to provide a semiconductor package and a method for fabricating the same, in which a molded underfilling technology is employed, and an encapsulating material having low viscosity and fine fillers can be used as to reduce the underfilling time.

A further objective of the invention is to provide a semiconductor package and a method for fabricating the same, in which an encapsulating material having low viscosity and fine fillers can be used to prevent flash thereof from occurring in a molded underfilled BGA semiconductor package with a highly integrated chip.

In accordance with the foregoing and other objectives, the present invention proposes a semiconductor package and a method for fabricating a semiconductor package. The semiconductor package of the invention comprises: a substrate mounted with at least one semiconductor chip thereon and electrically connected to the semiconductor chip; and an encapsulant for encapsulating the semiconductor chip, and formed with a plurality of outwardly-extending protruding portions, which are dimensioned to be smaller in height than the encapsulant.

The method for fabricating a semiconductor package of the invention comprises the steps of: preparing a substrate mounted with at least one semiconductor chip thereon via a plurality of conductive elements; providing a mold having a molding cavity dimensioned to accommodate the semiconductor chip therein, wherein the molding cavity is formed with a plurality of recess portions, which are dimensioned to be relatively smaller in height than the molding cavity, and the mold is formed with a plurality of air vents for interconnecting the recess portions and outside of the mold; and placing the substrate with the semiconductor chip mounted thereon in the mold,

and injecting a molding compound into the molding cavity to encapsulate the semiconductor chip.

Due to the recess portions relatively smaller in height, the molding compound more rapidly absorbs heat transmitted from the mold and thus slows down its flow when flowing into the recess portions of the molding cavity. The slowed down molding compound with increased viscosity can therefore be prevented from flashing out of the air vents, so that quality and appearance of the fabricated semiconductor package can be well assured.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be more fully understood by reading the following detailed description of the preferred embodiments, with reference made to the accompanying drawings, wherein:

FIG. 1 (PRIOR ART) is a sectional view of a FCBGA semiconductor package disclosed in the U.S. Patent No. 6,038,136;

FIG. 2 (PRIOR ART) is a top view of a conventional BGA semiconductor package with flash occurring around air vents;

FIG. 3A is a top view of a BGA semiconductor package of the invention;

FIG. 3B is a sectional view of FIG. 3A cutting along a line 3B-3B;

FIG. 4 is a sectional view of a FCBGA semiconductor package without carrying out a molded underfilling process;

FIG. 5 is a sectional view of a FCBGA semiconductor package in a molding process in the use of a method for fabricating a semiconductor package of the invention;

FIG. 6 is a bottom view of an upper mold of a mold used in a molding process of a method for fabricating a semiconductor package of the invention;

FIG. 7 is a topical magnified view of a flash preventing structure used in a